No. 635,345. Patented Oct. 24, 1899.

W. N. PACKER.

MACHINE FOR DEFIBRATING RAMIE.

(Application filed Feb. 2, 1899.)

(No Model.) 4 Sheets—Sheet 1.

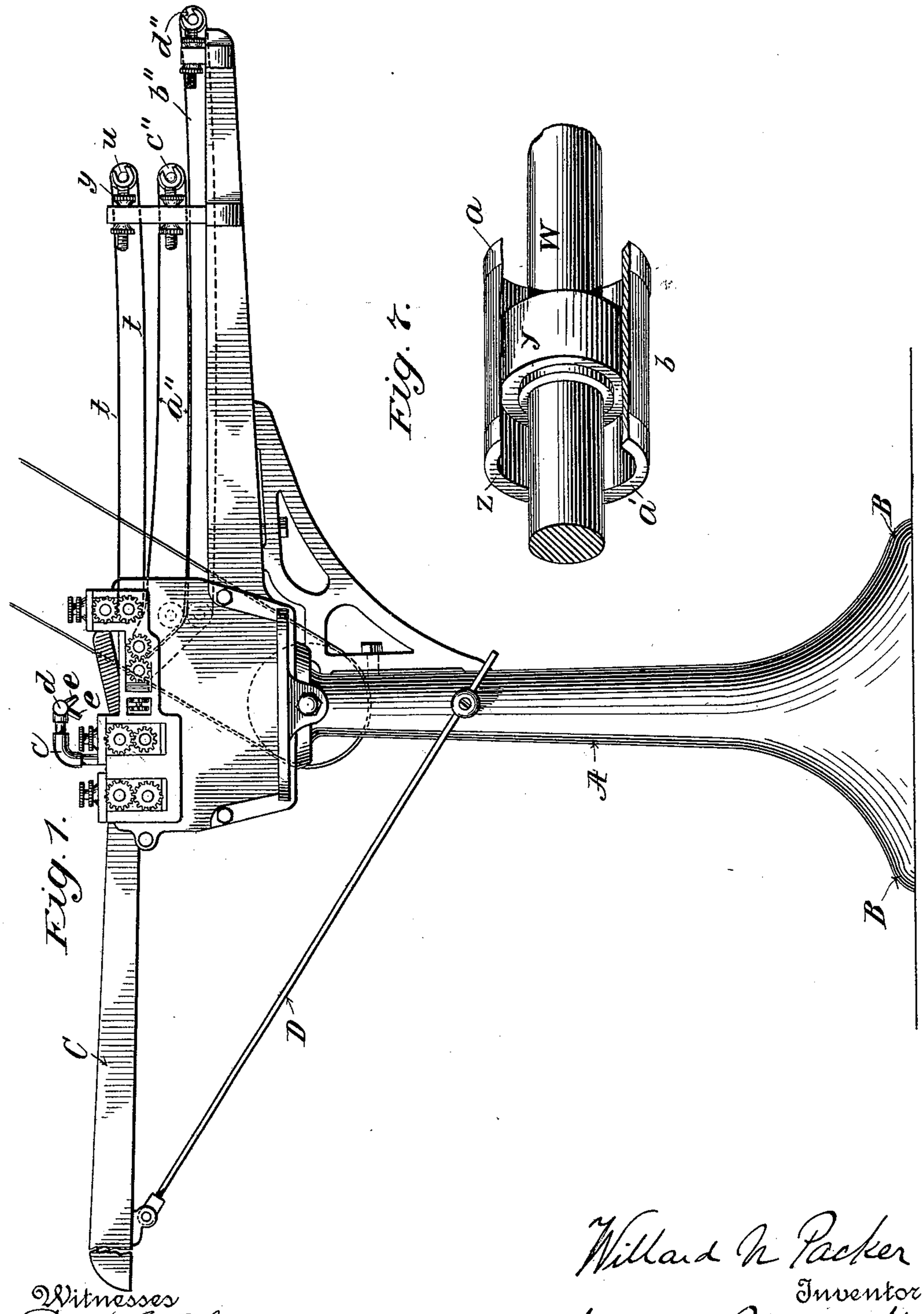

Fig. 1.

Fig. 2.

Witnesses
Edward C. Howland.
Edgar A. Mead.

Willard N. Packer
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By his Attorney Phillips Abbott

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(No Model.) 4 Sheets—Sheet 2.

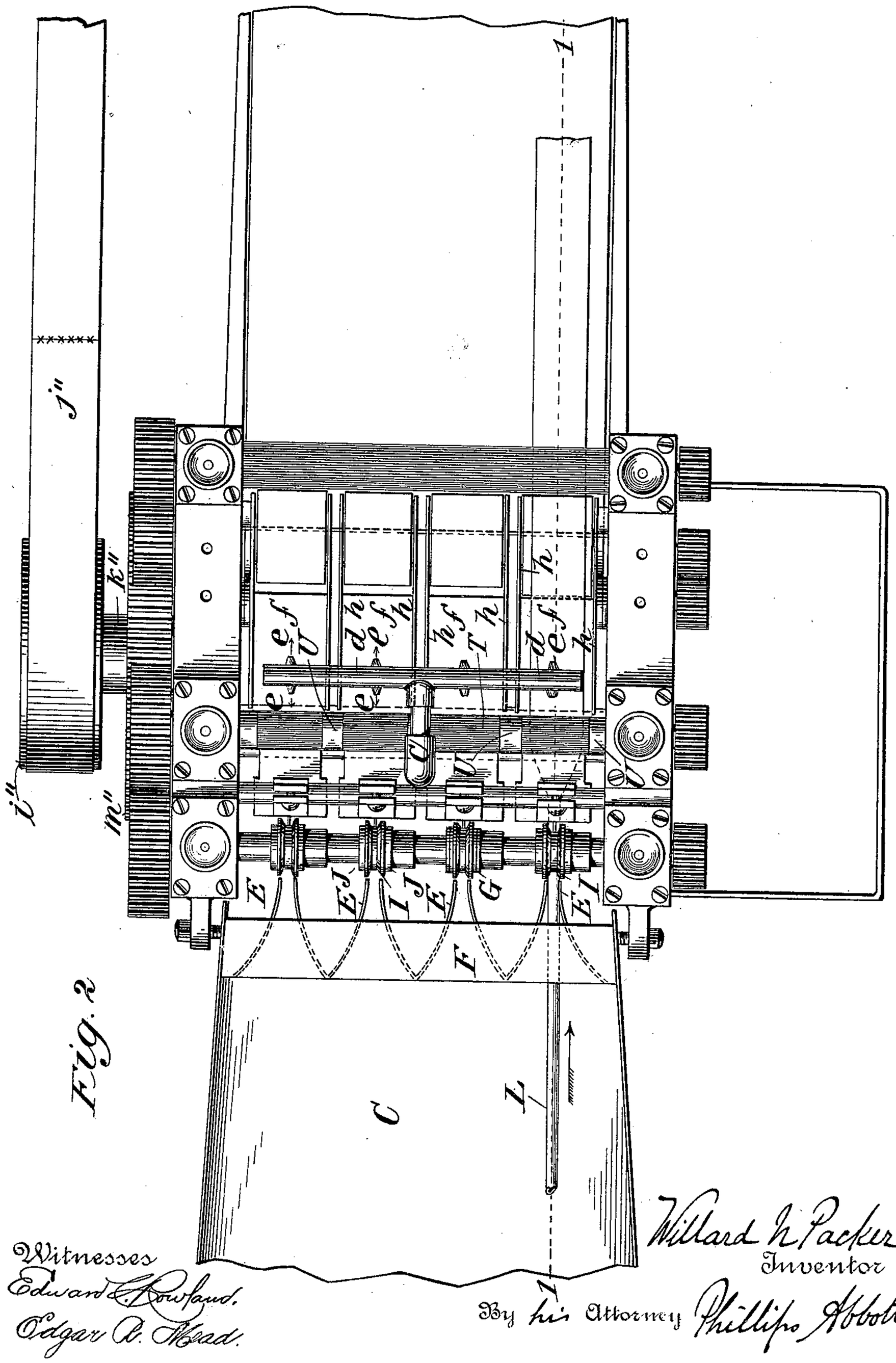

Fig. 2.

Witnesses
Edward C. Rowland.
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(No Model.) 4 Sheets—Sheet 3.

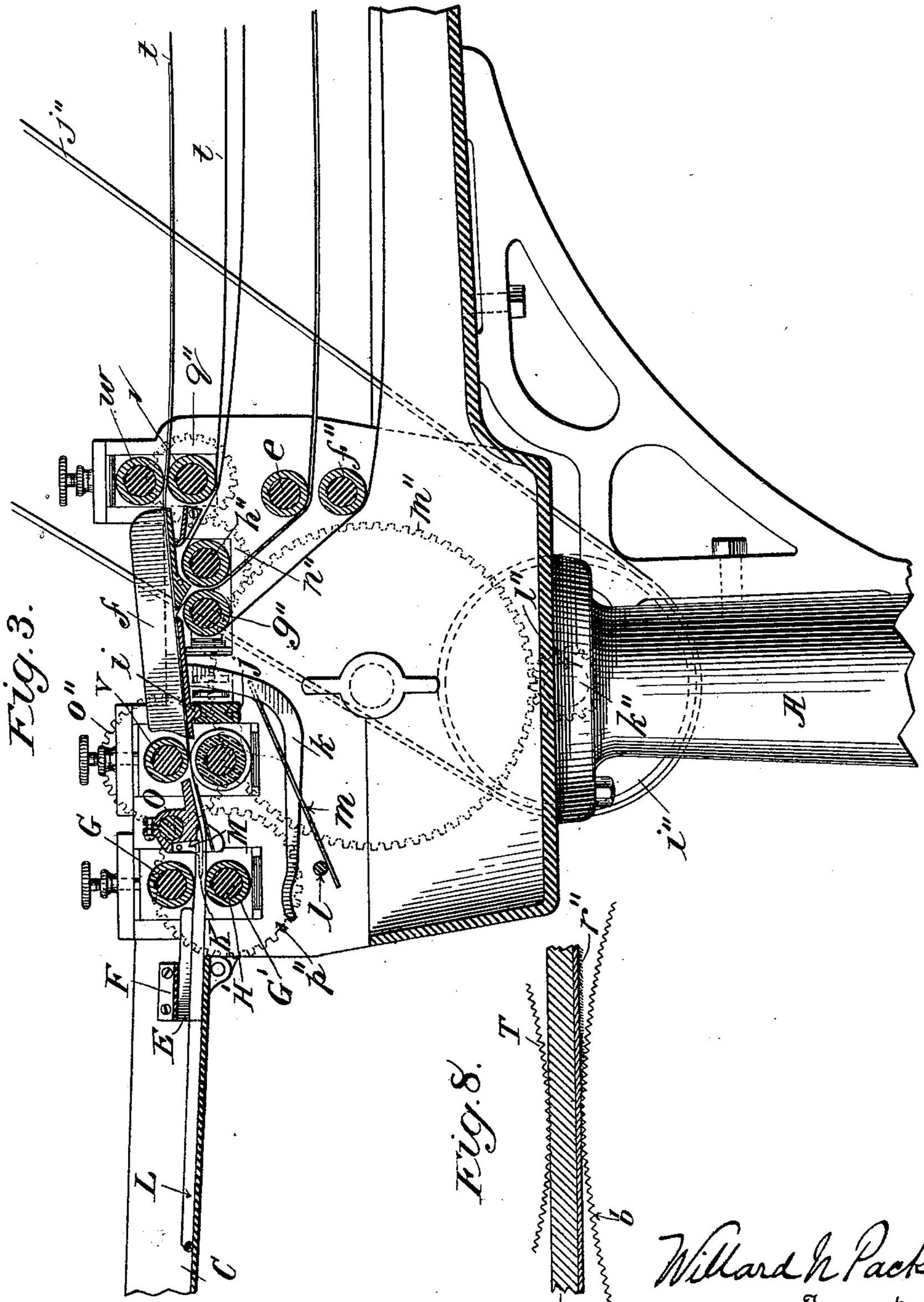

Fig. 3.

Fig. 8.

Witnesses
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(No Model.) 4 Sheets—Sheet 4.

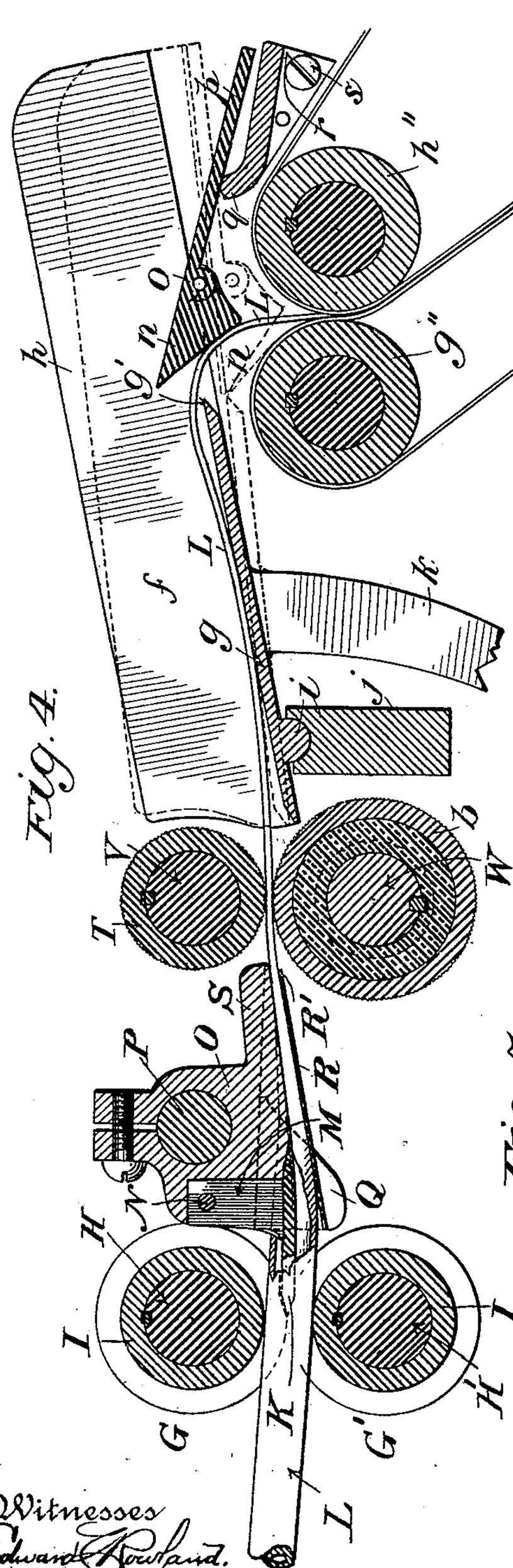

Fig. 4.

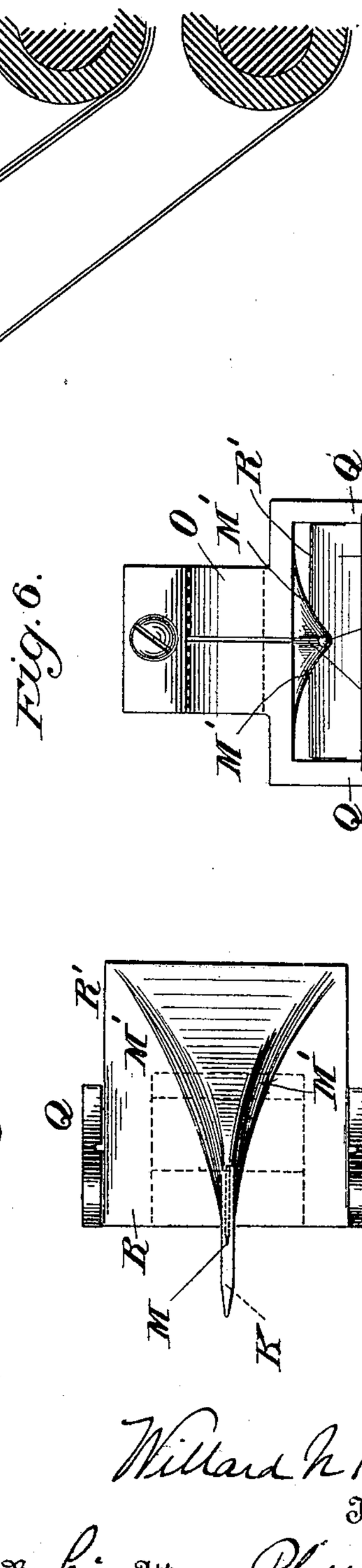

Fig. 6.

Fig. 5.

Witnesses
Edward Rowland.
Edgar A. Mead.

Willard N. Packer
Inventor
By his Attorney Phillips Abbott

UNITED STATES PATENT OFFICE.

WILLARD N. PACKER, OF CLEVELAND, OHIO, ASSIGNOR TO PHILLIPS ABBOTT, TRUSTEE, OF NEW YORK, N. Y.

MACHINE FOR DEFIBRATING RAMIE.

SPECIFICATION forming part of Letters Patent No. 635,345, dated October 24, 1899.

Application filed February 2, 1899. Serial No. 704,238. (No model.)

To all whom it may concern:

Be it known that I, WILLARD N. PACKER, a citizen of the United States, and a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Machine for Defibrating Ramie, (China-Grass,) Jute, and Similar Fibrous Plants, both Green and Dry, of which the following is a specification.

Before describing my invention I will refer to the machines heretofore invented, the use of which has been attempted, but so far as I am aware without any considerable success. In them all the reed or stalk is subjected to a breaking action, whereby the woody and pithy interior is broken up into small sections or pieces, and then for removing the same the reed thus broken is subjected to a beating, brushing, scraping, or similar operation. Sometimes the reed is permitted to pass straight through the machine, entering at one end in its normal condition and coming out at the other in the broken and beaten condition referred to, and sometimes it has been entered at one end in its normal condition and after being subjected to the operation of the machine withdrawn again by a reverse movement. Both of these prior methods injuriously affect the fiber for the following reasons: During the act of breaking up the reed the fiber itself is necessarily subjected to violent strains, tending to its disruption at the places where the woody material, which constitutes the interior of the reed, is broken transversely. Again, the fibrous part of the plant, which surrounds the woody and pithy interior, is necessarily split longitudinally, (the slits, however, do not always extend the whole length of the reed,) so that instead of being a continuous ribbon it is left after the breaking operation in the condition of a multitude of pieces or strands separated by slits of greater or less length and width. Furthermore, during the operation of separating or beating out the particles of wood and pith from the fiber it is necessary that the beating be quite severe, and this violent action still further breaks up the structure of the fiber, so that it attains a condition strongly resembling a multitude of separated strings or strands, which during the beating operation frequently become entangled or snarled, so that it is difficult, if not impossible, to properly treat these snarled portions in the subsequent degumming process or processes. Again, it is practically impossible to separate all of the woody and pithy particles from the fiber by these prior machines, and if particles thereof remain in the fiber during the degumming process they form nuclei about which the loose filaments or, as technically called, "filasse" of the fibrous material gather and wind themselves, so that a considerable portion of the product becomes what is known as "noils"—*i. e.*, tangled accumulations—which is practically worthless and constitutes a waste in the manufacture. In addition to this such portion of the fiber as may come through the breaking, beating, and degumming processes has been seriously injured by reason of the violent strains and disrupting influences to which it has been subjected, as before stated, so that its quality is not equal to that which would ensue were it not subjected thereto.

By my invention I so treat the reeds during the entire defibrating process that the fiber is subjected to no violence whatever and so that it is separated in a continuous flat ribbon-like piece from the wood and pith, which are likewise delivered in practically a single continuous and unbroken piece. The fiber is retained in as straight and perfect a condition when separated from the pith, wood, and gum-containing pellicle as it was when on the original reed. There is no entangling or snarling of the fiber, and the exterior bark or pellicle, which contains the objectionable gum, is largely, if not entirely, removed without injury to the fiber, and, lastly, it is delivered from the machine in condition to be readily gathered and handled in the subsequent operations.

The essential features of my invention are as follows: The reeds as cut in the fields and in green condition after having been topped, as usual, are fed in at one end of the machine, each reed passing by itself through suitable guides and feed-rollers which conduct it to a point where a pin enters the hollow pith-chamber of the reed, in which chamber the pin rests as a guide or centering de-

vice for the reed from end to end of its transit. Just at the rear end of the pin and on one side thereof a blade or slitting device is arranged, which slits the reed upon one side from end to end as it passes through the machine. Immediately in rear of the blade there are lateral spreading or deflecting surfaces, which fold the reed (now split) outwardly by an easy smooth motion, so that as it passes through the machine its formation has been changed in that instead of being a tubular structure, with the wood and pith in the interior, the fiber and gum containing pellicle surrounding it after the manner of a tube, it has become a flattened structure, with the wood and pith all on one side and in one plane and the fiber and gum containing pellicle all on the other side and in another plane. As the reed, now in its flattened condition, passes still farther through the machine, it encounters rollers, between which it passes. The lower roller, or the one which comes in contact with the exterior gum-carrying pellicle, is roughened on its surface and runs at a somewhat higher speed than the other or feeding roller, which acts as a resistance to it. Its surface is also roughened in such manner that since it bears upon the relatively tough woody portion it controls the speed of the reed in transit. The action of this higher-speed roller upon the exterior gum-containing pellicle is to rough it up, lifting it from the fiber, its action resembling to some extent that of a napping-roller on textile fabrics, and this lifting of the gum-containing pellicle so loosens it from the fiber to which it was formerly somewhat firmly attached that it will be entirely separate from the fiber upon being subjected to a slight rubbing operation. As the reed, now in its flattened condition, proceeds farther through the machine, it comes upon a tilting table, at about the center of which there is an upwardly-presented device resembling to a certain extent the upwardly-presented edge of a chisel, the inclined edge whereof is presented downwardly. This device is pivotally connected to the table, so that it is adapted to pivot relative thereto, and thus close an opening therein. As the end of the reed comes in contact with the inclined edge of the chisel-like device, which I will now call the "separator," it is deflected downwardly by its inclined surface and is thereby conducted between two rollers over which continually pass endless belts. The end of the reed which is presented between the belts on the said rollers is immediately grasped by them, and since the peripheral speed of these rollers (and consequently of the belts carried by them) is somewhat greater than that of the roughened feed-roller before referred to the reed is pulled forward by them so quickly as to be bent over a transverse edge in the table, which forms one side of the opening through which the reed passes, and the strain exerted upon the reed by reason of its being drawn downwardly over the said edge causes the table to rock upon its support, thus automatically operating the separator, and at the same time by reason of the sharp deflection of the reed causes the woody material and pith carried by it to break crosswise and to separate from the fiber in such manner that the woody material projects horizontally, or substantially so, from that point, the fiber only, together with a small section of the wood on the very end of the reed, passing downwardly through the endless belts referred to.

The separator, owing to the action above referred to, passes beneath the woody portion of the reed and acts as a table or guide over which the woody material passes and is conducted upon a delivery-belt therefor which is at the rear end of the machine, and this separator also insures the proper separation of all woody material from the fiber, particularly at the extreme ends of the reeds, after they have passed from the control of the feed-roller above referred to, and it will be noticed that the exterior pellicle, which has been roughened up and loosened from the fiber, comes in close rubbing contact with the edge of the opening through the table, drawing over that edge in its passage downward, so that at this point the loosened flaky or scale-like gummy material is separated from the fiber, and at the same time the "nap," so to speak, which was lifted by the high-speed roller above referred to is laid back smoothly upon the fiber. A considerable quantity of the gum accumulates just at this edge, which the next succeeding reed shoves forwardly, so that it drops through the opening in the table, which opening is by that time again formed owing to the return movement of the table consequent upon the termination of the passage of the preceding reed.

As above intimated, the woody material and pith are delivered from the machine in one place by a suitable delivery-belt, and the fiber, with the small terminal portion of the wood still left upon it, is delivered by suitable belts at another place at the end of the machine. The small terminal woody pieces left adhering to the fiber serve two useful purposes. First, they determine at a glance the butt-ends of the reeds, which is a desirable fact to know in the subsequent degumming processes, and likewise they afford means whereby the fiber, which is now in the form of flattened ribbons, may be hung upon wires or otherwise to dry by simply lapping the small woody end over the wire or suitable support, whereby the ribbons will be properly sustained, and since the adhesion of these small woody pieces to the fiber is but slight they practically all separate from the ribbons of fiber during the act of taking them down from the drying-wires. If not, a slight switching of the ends of the ribbons against a suitable obstruction will cause them all to fly off.

I will now give a detailed description of the construction of one form of the machine em-

bodying my invention, having reference to the drawings hereof, in which—

Figure 1 is a side elevation of the machine. Fig. 2 is a plan view thereof. Fig. 3 is an elevation in longitudinal section, taken through the line 1 1 of Fig. 2. Fig. 4 is a longitudinal vertical sectional view, enlarged, of portions of the machine, taken on the line 1 1 of Fig. 2. Fig. 5 is a plan view in detail of the slitting device. Fig. 6 is a front elevation in detail of that which is shown in Fig. 5. Fig. 7 illustrates a detail in perspective, partly broken away, of one section of the napping-roller. Fig. 8 illustrates a diagrammatical drawing showing the split and flattened reed considerably enlarged.

A is the standard upon which the machine is supported. It is preferably a casting and has an enlarged base B for firm support upon the floor.

C is the feeding-table, supported by a brace D.

E E are guides or deflectors, preferably, but not necessarily, made in the form of springs set vertically upon the feeding-table C. They are preferably attached to and supported by a transverse plate or bar F.

G G′ are the primary feed-rollers, set upon cross-shafts H H′. The operative faces of these feed-rollers are preferably made of yielding material, such as rubber, having a circumferential groove cast or otherwise formed therein, as seen at I, Fig. 2, having brass collars or washers J J by the sides of the rubber portion to properly sustain the same.

K (see particularly Figs. 4, 5, and 6) is the guiding or centering pin, which enters the pitch-chamber in the center of the reed, as shown best in Fig. 4.

L represents one of the reeds:

M is the slitter or blade, which is sharpened on its front edge and is attached by a screw N to a clamp O, which is attached, as shown, to a cross-shaft P. The pin K is brazed to this clamp O. From the lateral edges of the clamp there are depending lugs Q Q, to which is attached a flat spring R by being entered in grooves cut in the depending lugs Q Q, as shown best in Fig. 6. The rear end or edge of this spring (shown at R′) is free and has vertical play toward or away from a rearward extension S on the clamp O.

The under side of the clamp O is formed somewhat in the shape of a much-flattened double-moldboard plow upside down and with the cutting or sharp vertical edge just at the rear edge of the slitter or blade. These two surfaces or moldboards are shown at M′ M′, and in action they spread apart and turn outwardly into flattened condition the edges of the reed adjacent to the slit, so that it as a whole assumes a flat condition and so remains during the subsequent operations.

It will of course be understood that there are as many of the grooved rubber feed-rollers and as many clamps with pin, slitting-knife, &c., arranged transversely of the machine as may be desired, and this is true of the devices hereinafter to be described.

It will be noted that the forward end of the pin K is centrally located relative to the grooved feed-rollers both horizontally and vertically.

T is a roughened feed-roller, the roughness being given to it by nurling, fluting, or otherwise, as desired, and it has circumferential bands or spaces, (seen best in Fig. 2 at U U, &c.,) which are plain—in other words, smooth—the roughened sections lying between them. These plain or smooth surfaces project slightly above the roughened surfaces, so that should the machine at any time run without any reeds between these rollers their roughened surfaces will not be injured, because they will then be held apart by the slightly-raised smooth surfaces. The under or napping roller is provided with similar raised smooth surfaces, as will be explained hereinafter. The feed-roller T may be made as a solid structure having journals at the ends, or, as shown in Figs. 4 and 5, the exterior portion may be tubular in form and keyed to a shaft V.

The napping-roller above referred to is preferably peculiar in construction.

Reference being had to Fig. 7, W is a shaft which extends crosswise of the machine, upon which are a series of sections (one of which is shown in Fig. 7) each independent in action and made up as follows: Y is a hub or annular structure made of suitable resilient material, such as rubber, which supports an exterior tubular shell Z of steel or other metal. At the ends of this shell there are bands *a a′*, which are slightly raised above the medial section *b*, and these end sections *a a′* are plain or smooth upon their surfaces and are so arranged as to register with the plain or smooth sections U upon the upper or feed roller and they are of slightly-greater diameter than the medial portion *b*, the latter being nurled, fluted, or otherwise roughened, the same as the like sections in the upper or feed roller.

It will be observed, as above stated, that if the machine should be run with no reeds passing through it then the surfaces *a a′* of the lower or napping roller will come in contact with the surfaces U U of the upper or feed roller and that the rollers will rotate upon these surfaces and their roughened surfaces being of slightly less diameter than the plain portions referred to will not come in contact with each other. Therefore they will not injure each other. It will also be observed that the lower or napping roller is so constructed that each section is adapted to independent movement. They may rock upon their resilient parts Y to a certain extent, as required by the varying thickness of the flattened reeds passing through them. Also that a flattened reed having considerable thickness (for instance, the butt-end of it) may pass through one section of the napping-roller and the rela-

tively thin or tip end of another reed pass simultaneously through an adjacent section, and yet owing to the resilient character of the support Y each of the reeds will be properly acted upon. The yielding support or hub Y may be attached to the shaft W in any suitable manner.

c (see Figs. 1 and 2) is a pipe brought from any suitable source of water-supply, which connects with a transverse pipe *d*, provided with water-jets *e*, which project in such directions as desired, whereby water-jets under requisite pressure are thrown upon the operative parts of the machine to free them from the gum and other foreign matter, whereby the clogging of the machine thereby is effectually prevented.

f is the tilting table heretofore referred to. It is best shown in Figs. 3 and 4—in Fig. 4 in its normal position and in Fig. 3 in its depressed position consequent upon the passage of a reed over and through it. These tables are arranged transversely of the machine side by side and in such number as desired. Only one will be here described. It comprises a bottom part *g* and side pieces *h h*. At the front end thereof and on the under side of the bottom there is a fulcrum-point *i*, (see Fig. 4,) which is supported upon a cross-bar *j* of the frame. Immediately to the rear of this fulcrum-point there is a downwardly and forwardly extending arm *k*, (best shown in Fig. 3,) which extends toward the front of the machine and is there adapted to engage with a suitable stop *l*. Attached to this arm *k* there is a spring *m*, which passes beneath and is adapted to engage with the under side of the same stop *l*. Toward the rear end of the tilting table the chisel-like separator *n* is seen, which is pivoted at *o* to lugs which project downwardly from the sides *h* of the table. This separator *n* is in effect a portion of the bottom of the table referred to. At its front end appears the chisel-like projection and at the rear end there is a long projection *p*, which normally rests upon a support *q*, fastened by side brackets *r* and screw *s* to the side of the machine. The weight of the rearwardly-projecting portion *p* is such that as the rear end of the table is elevated gravity causes the separator automatically to tilt upon its pivotal points *o*, thereby assuming the position shown in Fig. 4—in other words, it is elevated in its normal position, so as to leave open the opening in the table. The function of the spring *m*, the curved arm *k*, and the stop *l* is to insure the upward tilting of the table *f g* as a whole when there are no reeds passing over or through it. This is effected by reason of the pressure of the spring *m* against the stop *l*, which tilts the table upwardly until the curved arm *k* engages with the same stop *l*. The position of the parts when depressed—in other words, during the time that a reed is passing over and through the table—is shown in Fig. 3, and the normal condition of the parts when not in operation is shown in Fig. 4, and in Fig. 4 the flattened reed L is seen, it having engaged with the separator *n*, been deflected downwardly by it, and is just about to pass between the appropriate delivery-belts already referred to.

Referring now to the delivery-belts, (seen best in Figs. 1 and 3,) *t* is the upper one, and, as before stated, it is in the form of a continuous apron which passes over a roller *u* at the rear end of the machine and over a roller *v* at the forward end. Above this roller *v* there is another one *w*, which receives the woody and pithy material as it passes over the separator and insures its proper feed or delivery to the belt *t*. In Fig. 1 suitable adjusting devices to determine the tension of this delivery belt or apron are shown at *y*.

The belts for delivering the fiber are two in number and are shown below the upper or wood and pith delivery belt. They are indicated by *a''* and *b''*. These belts respectively pass over guide-rollers *c''* and *d''* at the rear end of the machine and over deflecting or idler rollers *e''* and *f''* and likewise over guide-rollers *g''* and *h''*. It is obvious since the fiber is delivered between these belts and is carried in flat condition by them from the machine rearwardly that they must run in reverse directions—that is to say, the upper web of one of them runs from right to left and the upper web of the other runs from left to right, because the upper and under webs of the two belts must travel coincidently. The adjusting devices to regulate the tension of these belts are seen at the rear end of the machine in Fig. 1 and are or may be substantially the same as those described relative to the upper delivery-belt.

The guiding and deflecting rollers may be made of wood or metal or any other suitable material, or they may be composite or solid, as preferred. All this is immaterial. I, however, sometimes cover the rollers proper with an exterior shell of some material to prevent slipping and wear on the belts. This construction is shown in Fig. 3.

Certain ones only of the endless-belt rollers are positively driven. The others operate as supporting and guiding rollers and two of them, *e''* and *f''*, as belt-deflecting idlers.

The gearing is best shown in Figs. 2 and 3 as follows: *i''* is the main driving-wheel. It may be driven by belt *j''* or in any other way and is mounted upon the main shaft *k''*, upon which is a pinion *l''*, which gears into what may be called the "main" gear *m''*. It in turn meshes with a smaller gear *n''*, set upon the shaft *h''*, and also with a gear *o''*, set upon the shaft V, which carries the upper feed-roller T, and the gear *o''* in turn meshes into a gear *p''* upon the shaft II', which carries the lower primary feed-rollers G G'. The gear *n''* at the right of the machine meshes into another small gear *q''*, which drives the upper feed-belt.

In Fig. 2 other gears, which need not be described in detail, are shown upon the opposite

ends of the shafts above-referred to, whereby the coacting feed-rollers, belt, rollers, &c., are actuated.

In Fig. 8 I show, by a partially diagrammatical view, the operation of the feeding-roller T and the napping-roller *b* upon the slit and flattened reed. In this figure the roughened periphery only of the two rollers is shown, and T is represented as taking a firm hold upon the upwardly-presented woody and pithy surface of the flattened reed, whereby it is positively moved forward at a uniform speed and its movement controlled, and the roughened surface of the napping-roller *b*, which, as stated, runs at a higher speed than the feed-roller T, is shown as in contact with the gum-carrying exterior pellicle or outer bark of the fiber and as lifting and loosening the outer pelace. The surface so lifted is shown at the right at *r''*.

There are many features about the machine which have not been particularly referred to, because they do not present a patentable feature, and yet are desirable, if not necessary, in such a machine. At all events, they are used by me. I refer to the fact that the feed-roll T and the napping-roller are preferably built with elastic or yielding cushions or journals and are provided with means whereby they may be adjusted—as, for instance, the set-screws shown or other equivalent devices—so that lost motion, wear, &c., may be compensated for and proper tension applied to secure the desired results, as the size or, in some cases, the condition of the reeds may require. Also suitable means are provided for oiling the various parts, and provision is made for quickly and inexpensively removing certain parts—as, for instance, the clamp O, carrying the slitting-blade, and the guiding-needle, &c.—so that should they break or require sharpening such repair can be quickly effected. In many other respects certain details of the machine have not been particularly described.

The operation of the machine, in view of that which has heretofore been said, is obvious and no extended description need be given, excepting to say that the reeds are fed over the table C butt-end first. They pass through the guides E E and by them are directed between the primary feed-rollers G G'. By them they are centered so that the pin K enters the pithy chamber in the center of the reed. The knife or slitter M as the reed advances slits it open on one side and the deflecting-surfaces M' M' spread the reed laterally to right and left into a flat condition. Thence it passes between the extension S of the clamp O and the spring R, which exerts the necessary pressure upon the reed to maintain it in flat condition and to present it to the feeding and napping rollers in such flat state. It passes between the last-named rollers, whereby it is acted upon by the napping-roller to lift the gum-bearing pelace, as described. From that it passes rearwardly over the table *f* until its front end makes contact with the chisel-like end of the separator *n*, by which it is deflected downwardly between the belt-rollers *g''* and *h''*, whereby it is grasped, and since they run at a somewhat faster speed than the feeding-roller T they catch up with that roller, pull upon the reed, draw the table downwardly, and bend the reed over the edge of the table at *g'*, thereby causing the wood to split and separate from the fiber, and also the descent of the table automatically actuates the separator, which drops to a level with the bottom of the table *g*, so that the woody material can pass over it, the fiber passing downwardly, as described, and as the machine further operates the woody material is delivered over the separator *n p* out upon the delivery-belt, which carries it from the machine, and the fiber continues downwardly between the delivery-belts provided for it and is in turn delivered from them at the extreme right of the machine.

I call particular attention to the fact that in the operation of my machine the fiber is at no time subjected to any violence; that the operation consists in simply slitting the reed lengthwise, turning it into a flat form, so that the wood and pith are all upon one side or in one plane and the fiber all upon the opposite side or in another plane; that the wood and pith are not broken up into fine particles to be beaten from the fiber. On the contrary, they are separated and stripped therefrom all in one piece and without any action upon the fiber calculated to split it into separate shreds or in any manner to injure it; on the contrary, that the fiber comes away in the form of a continuous flat ribbon, having the length of the reed from which it was taken and a width substantially equal to its circumference, and that the fiber is not in the least entangled or twisted—in fact, it lies in the ribbon, as delivered by the machine, in the same parallel condition as that in which it was upon the living stalk, and that in the use of my machine there is no scraping or breaking of the fiber, nor is there any possibility that the same will become entangled.

I wish it to be understood that when in the claims hereof I refer to a "centering device" or words to that effect, without specifying its construction I mean devices different from mere guides, such as a hopper or the like or the spring-guides E E on the feed-table, as shown in the drawings hereof, which merely serve to direct the reeds into the machine. The centering devices I refer to should be such as are adapted to perform the functions of the pin K of this present case in so far as it insures the proper centering or presentation of the reeds relative to the slitter, whereby the reeds will be surely slit from end to end irrespective of their size and irrespective also of their tapering form. It is not essential, however, that the device or devices for thus centering the reeds should enter their interior as the pin K does, because, although I pre-

fer the pin construction for several reasons, still the same object can be accomplished by other means. Also when in the claims I refer to devices "for deflecting the split stalk," or words to that effect, so that the woody material may break crosswise at one point, I refer to means which shall have substantially the same action as the deflector or separator *n* in contradistinction to a beater or breaker, heretofore frequently used in such machines. The deflector or separator of my invention simply bends the reed so as to cause the woody material to break transversely without splitting or shredding the fiber or breaking up the wood—not, at least, to any considerable extent—so that the wood and the fiber will be separated from each other and delivered from the machine each in substantially a single piece.

It will be obvious to those who are familiar with mechanical matters that many alterations may be made in the details of construction of the machine without departing from the essentials thereof—that is to say, a bell-mouthed or trumpet-like guide may be substituted for the primary guides at the front of the machine. Also the pin and the slitting-blade may be differently constructed and arranged and differently connected to the parts which support them. Also an exterior guiding device elastic in its construction may be substituted for the pin which enters the pith-chamber of the reed. Such a device would not be as satisfactory, in my judgment, as the pin; but it could be used nevertheless. Also the details of construction of the tilting table and the automatically-acting separator may be modified, and in various other respects the details, as shown, may be departed from and still the essentials of my invention be employed.

Having described my invention, I claim—

1. In a defibrating-machine, the combination of a feed-table, guiding devices on the feed-table, feeding-rollers, a centering device in rear of the feed-rollers, a slitter adjacent to the centering device, means in rear of the slitter to flatten the reed, a feed-roller which engages with the woody material, a napping-roller which runs faster than said last-named feed-roller and having a roughened surface which engages with the exterior of the fiber, means to deflect the reed over a support, means to pull the fiber over said support and thereby to strip the woody material therefrom, and delivery devices for the woody material and for the fiber, for the purposes set forth.

2. In a defibrating-machine the combination of feeding-rollers, a centering device in rear of the feed-rollers, a slitter adjacent thereto, devices in rear of the slitter to flatten the reed, a feed-roller which engages with the woody material, a napping-roller which runs faster than said last-named feed-roller and having a roughened surface which engages with the exterior of the fiber, means to deflect the flattened reed over a support, and means to pull the fiber over said support and thereby to strip the woody material from the fiber, for the purposes set forth.

3. In a defibrating-machine the combination of grooved feeding-rollers, a centering device, a slitter adjacent thereto, devices in rear of the slitter to flatten the reed, means to deflect the flattened reed over a support, and means to pull the fiber over said support and thereby to strip the woody material from the fiber, for the purposes set forth.

4. In a defibrating machine the combination of grooved feeding-rollers, a centering device in rear of the feed-rollers, a slitter adjacent thereto, devices in rear of the slitter to flatten the reed, means to deflect the flattened reed over a support, means to pull the fiber over said support and thereby to strip the woody material from the fiber, and delivery devices for the woody material and for the fiber, for the purposes set forth.

5. In a defibrating-machine the combination of a feed-table, guiding devices on the feed-table, feeding-rollers, a centering device in rear of the feed-rollers, a slitter adjacent thereto, means to discharge water upon the operative parts of the machine, devices to flatten the reed, a feeding-roller which engages with the woody material and controls its movements, a napping-roller which runs faster than the last-named feed-roller and having a roughened surface, which engages with the exterior of the fiber, means to deflect the flattened reed over a support, means to pull the fiber over said support and thereby to strip the woody material from the fiber, and delivery devices for the woody material, for the purposes set forth.

6. In a defibrating-machine the combination of feeding-rollers, a slitter adjacent thereto, devices in rear of the slitter to flatten the reed, an inclined surface against which the end of the flattened reed strikes and by which it is deflected over a support, and means to pull the fiber over said support and thereby to strip the woody material from it, for the purposes set forth.

7. In a defibrating-machine the combination of grooved feeding-rollers, a slitter adjacent thereto, devices in rear of the slitter to flatten the reed, a feed-roller which engages with the woody material, a napping-roller which runs faster than said last-named feed-roller and which engages with the exterior of the fiber, means to deflect the flattened reed over a support, means to pull the fiber over said support and thereby break the woody material at one point only, and means to strip the woody material from the fiber, for the purposes set forth.

8. In a defibrating-machine the combination of a feed-table, guiding devices on the feed-table, feeding-rollers in rear thereof, a slitter adjacent thereto, devices in rear of the slitter to flatten the reed, a feeding-roller which engages with the woody material, a

napping-roller which runs faster than the last-named feed-roller and having a roughened surface which engages with the exterior of the fiber, means to deflect the flattened reed over a support, and means to pull the fiber over said support and thereby to strip the wood from the fiber, for the purposes set forth.

9. In a defibrating-machine the combination of a centering device, a slitter adjacent thereto, devices in rear of the slitter to flatten the reed, feeding devices in rear of the flattening devices, an inclined surface against which the end of the flattened reed strikes and by which it is deflected, and means which grasp the deflected end of the reed and pull the fiber along, for the purposes set forth.

10. In a defibrating-machine the combination of a centering device, a slitter adjacent thereto, devices in rear of the slitter to flatten the reed, feeding devices in rear of the flattening devices, means to deflect the flattened reed over a support, means to pull the fiber over said support and thereby to break the woody material at one point only, and means adapted to enter between the woody material and the fiber at the said point of fracture to insure the separation of the wood from the fiber, for the purposes set forth.

11. In a defibrating-machine the combination of a centering device, a slitter adjacent thereto, devices in rear of the slitter to flatten the reed, feeding devices in rear of the flattening devices, means to deflect the flattened reed over a support, means to pull the fiber over said support whereby it will be broken in one place only, means adapted to enter between the woody material and the fiber at said point of fracture to insure the separation of the wood from the fiber, and delivery devices for the woody material and the fiber, for the purposes set forth.

12. In a defibrating-machine, a centering device which enters the reed, a slitter adjacent thereto, and devices in rear of the slitter to flatten the reed by bending the same laterally to right and left, and means to apply pressure upon the reed as flattened, for the purposes set forth.

13. In a defibrating-machine, a device for slitting and flattening the reed, embodying a pin adapted to enter the pith-chamber of the reed, a slitter adjacent to the pin, and means to open the slitted reed laterally to the right and left, for the purposes set forth.

14. In a defibrating-machine, means to loosen the exterior, gum-containing pelace, embodying a feed-roller having a roughened surface which engages with the woody material of the reed and thereby controls its movement, and an automatically-yielding napping-roller which engages with the exterior of the fiber, the surface of which is roughened and which revolves at a different speed from that of the feed-roller, for the purposes set forth.

15. In a defibrating-machine, means to loosen the exterior, gum-containing pelace, embodying a feed-roller which controls the movement of the reed by engaging with the woody part thereof, and a shaft supporting and actuating a series of independently-acting and resiliently-supported napping-rollers, the exterior surfaces whereof are roughened in whole or in part, for the purposes set forth.

16. In a defibrating-machine, means to feed the reed and to loosen the gum-containing pelace, embodying a feed-roller, the surface of which is roughened, whereby the movement of the reed may be controlled, and a napping-roller adapted to run at a different speed from the feed-roller, the surface of which is likewise roughened, and circumferential bands on both of said rollers having slightly greater diameter than their roughened portions respectively, for the purposes set forth.

17. In a defibrating-machine devices to separate the woody material from the fiber, embodying a table or like device, means to feed the reed across the table, an inclined surface projecting beyond the table against which the end of the reed strikes and by which it is deflected and the wood broken transversely at one point only, and means to grasp and pull the fiber along, for the purposes set forth.

18. In a defibrating-machine means to separate the wood from the fiber, embodying a table or like device, a deflector placed at an angle relative to the plane of the table, against which the reed presses as it is fed along and by which it will be deflected and directed between moving devices adapted to grip and pull it forward, and said moving devices themselves, for the purposes set forth.

19. In a defibrating-machine, a device for separating the wood from the fiber, embodying a tilting table, a chisel-like separator pivoted to the table in such manner as that its end normally rests at an angle to the table, projecting therefrom, pulling-rollers adjacent to the table, between which the separator deflects the reed and by which the reed is pulled upon to rock the table and cause the automatic closing of the separator, for the purposes set forth.

20. In a defibrating-machine, a slitter constructed and arranged to slit the reed on one side only, embodying a pin which enters the reed and a knife at one side thereof, devices in rear of the slitter to open the slit reed to right and left into a flat, ribbon-like form, and feeding and guiding devices in front of said pin, for the purposes set forth.

21. In a defibrating-machine, means to separate the woody material from the fiber of a slit and flattened reed, embodying devices to deflect the said reed over an edge so that the woody material will break crosswise at one point, and means to pull the fiber and the wood forwardly, whereby the fiber will be stripped from the wood by continued strain upon it at an angle different to the plane of the woody material, for the purposes set forth.

22. In a defibrating-machine, a device for

slitting reeds open at one side, embodying a pin adapted to enter the pith-chamber of the reed, and a blade or slitter in rear of and radiating from said pin, for the purposes set forth.

23. In a defibrating-machine, means for separating the woody material from the fiber of a slit and flattened reed, embodying a tilting table across which the reed passes, a deflecting and stripping device having a chisel-like forward edge pivoted to said table, means to support one end of the said chisel-like device whereby it will automatically rise or fall upon the tilting of the table, and means to return the table to its normal position when pressure thereon is removed, for the purposes set forth.

24. In a defibrating-machine, the combination of devices for slitting the reeds on one side, devices in rear of the slitter for opening the reeds to right and left into flattened condition, a feed-roller adapted to engage with the woody material, a napping-roller running at a different speed from the feed-roller and adapted to engage with the fibrous material, and a pipe or tubes adapted to discharge water-jets upon and about said devices, for the purposes set forth.

25. In a defibrating-machine the combination of a centering device adapted to enter the reed, a knife projecting at one side of the said centering device and adapted to split the reed open at one side, and a spring adjacent to the slitting device which aids in holding the slitted reed in flattened condition, for the purposes set forth.

Signed at New York, in the county of New York and State of New York, this 31st day of January, A. D. 1899.

WILLARD N. PACKER.

Witnesses:
PHILLIPS ABBOTT,
WALTER H. CRITTENDEN.